

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2003-114806

(43)Date of publication of application : 18.04.2003

(51)Int.Cl.

G06F 11/00

(21)Application number : 2001-308156

(71)Applicant : HITACHI LTD

(22)Date of filing : 04.10.2001

(72)Inventor : OSHIMA SATOSHI

KIMURA SHINJI

ARAI TOSHIKI

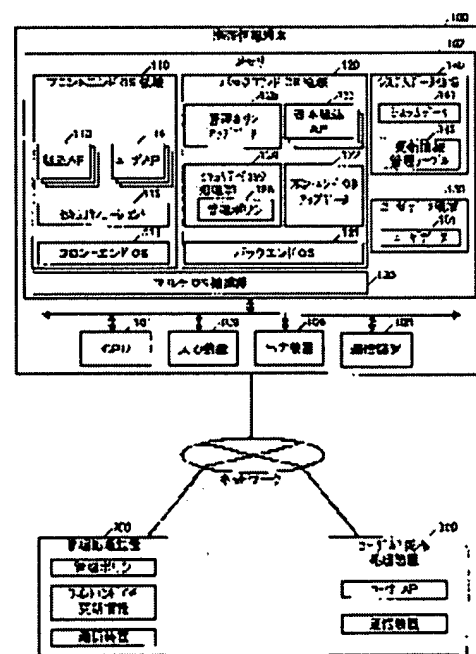
(54) OS UPDATING METHOD, SECURITY CONTROL METHOD, AND APPARATUS FOR ACCOMPLISHING THE SAME

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a technology enabling an OS in an information processor to be updated efficiently.

SOLUTION: A method for updating the OS installed in the information processor comprises the steps of: determining whether it is necessary to update a front end OS that controls an ordinary application processing; switching to a back end OS for the control of the information processor after ending the front end OS in operation when it is determined that updating of the front end OS is necessary; updating the front end OS to the latest state by obtaining updating data for updating the front end OS to the latest state under the control of the back end OS; and restarting the updated front end OS.

図 1



## LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

\* NOTICES \*

JPO and NCIP are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

DETAILED DESCRIPTION

---

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention is applied to the information processor which offers the updating function, security function, and remote maintenance function of OS by loading of two or more OS's especially about the information processor which performs renewal of an operating system (OS), implementation of the security according to a management polish, and remote maintenance of a management polish, and relates to an effective technique.

[0002]

[Description of the Prior Art] Various functions are increasingly offered with a Personal Digital Assistant, such as accessing the Internet, or downloading music data, reproducing, or taking a user's photograph and transmitting as an electronic mail with the rapid advance of Personal Digital Assistants, such as a cellular phone in recent years.

[0003] In such a Personal Digital Assistant, the data accessed by OS, the inclusion application program (inclusion AP) and user application programs (user AP), or those processings are stored in the nonvolatile memory in a Personal Digital Assistant, when actuation from a power up or a user is performed, the program on-said nonvolatile memory is started and various functions are offered.

[0004] Although it is necessary to update the program on said nonvolatile memory to perform the case where a functional addition is newly performed, and the existing program modification, in said conventional Personal Digital Assistant When updating the program on the nonvolatile memory in a Personal Digital Assistant, a Personal Digital Assistant is connected to information processors of dedication, such as a personal computer (PC). It is necessary to rewrite the contents of the nonvolatile memory in a Personal Digital Assistant by actuation of the information processor, and since it is difficult, that a general user carries out brings a terminal body to a service center, and it is rewriting the program. Moreover, the costs in that case are paid by the terminal provider.

[0005] whether on the other hand, although the Personal Digital Assistants which can download and perform User AP are increasing in number in high-performance-izing and the Personal Digital Assistant to multi-functionalize, the information which is in a Personal Digital Assistant in the case of activation of an application process can be accessed, and a \*\*\*\*\* [ that the communication link with the exterior can be performed ] -- \*\* -- a setup about the said security is altogether performed by the service entrepreneur side who offers the Personal Digital Assistant.

[0006] For example, in order for the service entrepreneur who is offering service for consuming public to prevent the address book within a terminal leaking outside, he has restricted the application which can access the information and the exterior within a terminal at coincidence only to the application which the service entrepreneur himself offers.

[0007] In addition, the renewal equipment of a program and the renewal approach of a program of updating the data of a part of program blocks of the program data which consist of two or more program blocks memorized by the flash memory are indicated by JP,2000-242487,A. As opposed to the flash memory which memorized two or more program blocks for the outline to realize each function of A-E for example When updating OS data of Function D, before eliminating the data of the 4th memory block Were stored in the 4th memory block with OS data of Function D. Some OS data of Function C, and some data of OS data of Function E After evacuating to a personal computer temporarily and eliminating the data of the 4th memory block, evacuation data are written in the original location of the 4th memory block with OS data of the new function D.

[0008]

[Problem(s) to be Solved by the Invention] In said conventional Personal Digital Assistant, it is difficult to update OS, Inclusion AP, etc. at a user side, and since it is necessary to bring a terminal body to a service center and to rewrite a program, the problem of requiring great time amount and immense costs is in the updating activity of OS or Inclusion AP. Since it will be thought with advanced features of a Personal Digital Assistant, and high-performance-izing from now on that the problem of generating of a bug increases increasingly, it is necessary to solve the problem at the time of renewal of this program.

[0009] On the other hand, although advancing to the world of business like current PC from now on is expected in high-performance-izing and the Personal Digital Assistant to multi-functionalize Since the security of the present Personal Digital Assistant is altogether set up by the service entrepreneur side who offers the Personal Digital Assistant, When a company uses this, the business-use application which one set up also has the problem that access propriety of application cannot be determined on different criteria from the service entrepreneur of enabling it to access the information on terminal inside and outside etc.

[0010] Moreover, in said conventional Personal Digital Assistant, even if a service entrepreneur sets up the information on access propriety along with the demand by the side of a company Information like the access propriety of the once set-up application is memorized by the nonvolatile memory within a terminal. Since effective means, such as remote maintenance which updates this information, are not offered, terminals are collected whenever it changes the function of business oriented application according to change of a work breakdown. It is necessary to update business oriented application and corresponding security information using the equipment of dedication, and there is a problem that big time amount and costs start the maintenance of business oriented application and its security information.

[0011] The purpose of this invention solves the above-mentioned problem, and it is in offering the technique which can update OS of an information processor efficiently. Other purposes of this invention are to offer the technique which can realize the security function based on a user's original criteria with an information processor. Other purposes of this invention are to offer the technique which can carry out remote maintenance of the security function in an information processor.

[0012]

[Means for Solving the Problem] In the information processor which updates OS installed in equipment, this invention updates a front end OS under control of Back-end OS, when judged with a front end OS needing to be updated.

[0013] In this invention, it accesses to a management processor through a network from the information processor which are Personal Digital Assistants, such as a cellular phone, and the update information of the front end OS which controls the usual application process is acquired from a management processor, the management information and said acquired update information of the front end OS installed in the information processor are compared, and it judges whether the front end OS installed in the information processor needs to be updated.

[0014] When judged with said front end OS needing to be updated After enabling actuation of the information processor under control of Back-end OS by terminating processing of the working front end OS and switching control of each part in an information processor to Back-end OS by processing of the multi-OS configuration section, It accesses to a management processor through a network, the updating data for updating a front end OS in the newest condition are acquired from a management processor under control of Back-end OS, and a front end OS is updated in the newest condition.

[0015] And after rebooting the front end OS updated by said newest condition, it switches to the front end OS after updating control of each part in an information processor, and actuation of the information processor by control of the front end OS after updating is enabled.

[0016] Since a front end OS is updated under control of Back-end OS according to the information processor of this invention as mentioned above when judged with a front end OS needing to be updated, it is possible to update OS of an information processor efficiently.

[0017]

[Embodiment of the Invention] The information processor of 1 operation gestalt which provides below with the updating function, security function, and remote maintenance function of OS by loading of two or more OS's is explained.

[0018] Drawing 1 is drawing showing the outline configuration of the Personal Digital Assistant multi-OS system of this operation gestalt. As shown in drawing 1, the Personal Digital Assistant multi-OS system of this operation gestalt has Personal Digital Assistant 100, the management processor 200, and the user AP distribution processor 300.

[0019] Personal Digital Assistant 100 is the information processor of pocket molds, such as a cellular phone which acquires front end OS update information and a management polish from the management processor 200, and realizes the updating function, security function, and remote maintenance function of OS.

[0020] The management processor 200 is a processor which offers those newest information to Personal Digital Assistant 100 about front end OS update information or a management polish. The user AP distribution processor 300 is a processor which distributes User AP to Personal Digital Assistant 100 according to the demand from Personal Digital Assistant 100.

[0021] Personal Digital Assistant 100 has CPU101, memory 102, an input unit 103, an output unit 104, a communication device 105, the front end OS field 110, the back-end OS field 120, the management polish 126, the system data field 140, system data 141, the update information managed table 142, the user data area 150, and the user data 151.

[0022] CPU101 is equipment which controls actuation of the Personal Digital Assistant 100 whole. In case memory 102 controls actuation of the Personal Digital Assistant 100 whole, it is the storage of non-volatiles, such as a flash memory which loads the various processing programs and data for it.

[0023] An input unit 103 is equipment which performs the various inputs for operating Personal Digital Assistant 100. An output unit 104 is equipment which performs the various outputs accompanying actuation of Personal Digital Assistant 100. A communication device 105 is equipment which also performs a voice message while performing the communication link with other processors through networks, such as the Internet and intranet.

[0024] The front end OS field 110 is a field which stores the various programs which operate under a front end OS 111 and its control. The back-end OS field 120 is a field which stores the various programs which operate under a back-end OS 121 and its control. The management polish 126 is data in which the contents of the application process to which activation is permitted on Personal Digital Assistant 100 are shown.

[0025] The system data field 140 is a field which stores system data 141. System data 141 is data used in case the system program of a front end OS 111, a back-end OS 121, and multi-OS configuration section 130 grade operates. The update information managed table 142 is a table which stores a front end OS 111 and the update information of inclusion AP 113.

[0026] The user data area 150 is a field which stores the user data 151. The user data 151 are data acquired or created by the application process of user AP114 grade, such as address book data and schedule data.

[0027] Moreover, Personal Digital Assistant 100 has a user AP 114, a back-end OS 121 and the front end OS updater 122, the basic inclusion AP 123 and the security check processing section 124, the management polish updater 125, and the multi-OS configuration section 130. [ a front end OS 111, the security agent 112, ] [ inclusion AP 113, ]

[0028] A front end OS 111 is OS which controls the usual application process of inclusion AP 113 and user AP114 grade. The security agent 112 is the processing section which performs the application process, when the contents of delivery and said inquiry result show the execute permission of the application process concerned to the security check processing section 124 for the inquiry of whether the processing demand is permitted when the processing demand of application is performed on Personal Digital Assistant 100.

[0029] Inclusion AP 113 is the processing section which performs predetermined application processes, such as address book edit processing included in the front end OS 111. A user AP 114 is the processing section which performs predetermined application processes, such as estimated processing distributed from the user AP distribution processor 300.

[0030] A back-end OS 121 controls actuation of Personal Digital Assistant 100 during a halt of a front end OS 111, and is OS which operates responding to the processing demand from the security agent 112 in the case of security check processing.

[0031] It is the processing section which judges whether renewal of the front end OS 111 which controls the usual application process is required for the front end OS updater 122, acquires the updating data for updating a front end OS 111 in the newest condition under control of a back-end OS 121, and updates a front end OS 111 in the newest condition.

[0032] The basic inclusion AP 123 is a necessary minimum subset for operating as a cellular phone in inclusion AP 113, for example, when an address book AP, the ringer melody creation AP, and Game AP are in inclusion AP 113, the address book AP which can perform only the telephone by perusal and it is contained, and it is the processing section which, if possible, lessened room for a bug to enter into a back-end OS 121 side.

[0033] The security check processing section 124 is the processing section which answers the security agent 112 in the inquiry result which shows the contents of a judgment, after judging whether the processing demand to which said inquiry was performed is permitted according to the management polish 126. The management polish updater 125 is the processing section which updates the management polish 126 in Personal Digital Assistant 100 according to the contents of the management polish stored in the management processor 200.

[0034] The multi-OS configuration section 130 Operate a front end OS 111 and a back-end OS 121 by the time slice, and the communication link between the security agent 112 on a front end OS 111 and the security check processing section 124 on a back-end OS 121 is controlled. When judged with a front end OS 111 needing to be updated After terminating processing of the working front end OS 111 and switching control of Personal Digital Assistant 100 to a back-end OS 121, it is the processing section which reboots the front end OS 111 updated by said newest condition.

[0035] The program for operating Personal Digital Assistant 100 as a front end OS 111, the security agent 112, inclusion AP 113, a user AP 114, a back-end OS 121, the front end OS updater 122, the basic inclusion AP 123, the security check processing section 124, the management polish updater 125, and the multi-OS configuration section 130 shall be recorded on record media, such as a flash memory, and shall be performed. In addition, other record media other than a flash memory are sufficient as the record medium which records said program. Moreover, it is good also as what may install and use said program for an information processor from the record medium concerned, accesses the

record medium concerned through a network, and uses said program.

[0036] The front end OS 111 which controls the usual application process of inclusion AP 113 and user AP114 grade by Personal Digital Assistant 100 of this operation gestalt The configuration of multi-OS to which the back-end OS 121 which controls actuation of Personal Digital Assistant 100 during a halt of a front end OS 111 operates by the time slice is taken. The newest OS equipped with GUI (Graphical User Interface) which was excellent as a front end OS 111 is installed. Personal Digital Assistant 100 shall be operated using OS of the version before actuation is stable as a back-end OS 121. Here, OS stabilized when another OS operating stably turns out to be as a back-end OS 121 was used or the same version also restricted a function greatly may be used.

[0037] When adding a new function to a front end OS 111, or in correcting the fault the front end OS 111 was newly discovered, assign the input unit 103, the output unit 104, and communication device 105 of Personal Digital Assistant 100 to a back-end OS 121 from a front end OS 111 by the multi-OS configuration section 130, and it is made to operate, and updates a front end OS 111 under control of a back-end OS 121. Here, the change to a back-end OS 121 shall be performed by mapping interruption of the I/O process mapped by the front end OS 111 in a back-end OS 121 from the front end OS 111 by the multi-OS configuration section 130.

[0038] In the Personal Digital Assistant multi-OS system of this operation gestalt, the front end OS updater 122 is operated under control of a back-end OS 121, updating data are downloaded to below through a network, an update process is performed to it, and the processing which updates a front end OS 111 and inclusion AP 113 is explained to it.

[0039] Drawing 2 is a flow chart which shows the procedure of the front end OS updater 122 of this operation gestalt. As shown in drawing 2 , it judges whether renewal of the front end OS 111 which controls the usual application process is required for the front end OS updater 122 of Personal Digital Assistant 100 of this operation gestalt, and processing which acquires the updating data for updating a front end OS 111 in the newest condition under control of a back-end OS 121, and updates a front end OS 111 in the newest condition is performed.

[0040] The front end OS updater 122 of Personal Digital Assistant 100 investigates whether when a specific key was pressed from progress of the predetermined time from the last processing, or a user, the predetermined conditions which start an update process of a front end OS 111 were fulfilled at step 201, and when said conditions are fulfilled, it progresses to step 202.

[0041] At step 202, the contents of the update information managed table 142 on which the front end OS 111 installed in Personal Digital Assistant 100 and the various information on inclusion AP 113 are stored are read.

[0042] Drawing 3 is drawing showing an example of the update information managed table 142 of this operation gestalt. As shown in drawing 3 , on the update information managed table 142 of this operation gestalt The front end OS 111 stored in the front end OS field 110, and the version of inclusion AP 113, The updating date which shows the date by which a front end OS 111 and inclusion AP 113 were stored in the front end OS field 110, The storing address and its die length in the front end OS field 110, The update information acquisition place URL (Uniform Resource Locator) which shows the address of the management processor 200 which offers a front end OS 111 and the update information of inclusion AP 113 is stored.

[0043] At step 203, the front end OS updater 122 accesses the address of the management processor 200 shown in the update information acquisition place URL in said read update information managed table 142, and requires transmission of a front end OS 111 and the update information of inclusion AP 113 of the management processor 200.

[0044] When the communication device 105 is assigned to the front end OS 111 and assigned to a back-end OS 121 in the case of a demand of this update information, the switch demand of connection of the communication device 105 to a back-end OS 121 shall be given from a front end OS 111 to the multi-OS configuration section 130. In addition, it is good also as what adopts OS which was excellent in the real-time operation as a back-end OS 121, and the back-end OS 121 is always performing about communications processing.

[0045] If an acquisition demand of a front end OS 111 and the update information of inclusion AP 113 is received from Personal Digital Assistant 100, the management processor 200 will read the front end OS update information stored in the management processor 200, and will transmit it to Personal Digital Assistant 100. The newest version and newest updating date of a front end OS 111 and inclusion AP 113 shall be stored in the front end OS update information of the management processor 200 here.

[0046] The front end OS updater 122 of Personal Digital Assistant 100 The front end OS 111, the version of inclusion AP 113, and updating date which will progress to step 204 if front end OS update information is received from the management processor 200, and are stored in the update information managed table 142, The version and updating date in the front end OS update information received from the management processor 200 are compared, and when the version stored in the update information managed table 142 and the updating date are older, an update process progresses to step 205 as a required thing.

[0047] At step 205, the multi-OS configuration section 130 is called through a back-end OS 121, and termination of a

front end OS 111 and inclusion AP 113 is required of the multi-OS configuration section 130.

[0048] If a front end OS 111 and the termination demand of inclusion AP 113 are received from the front end OS updater 122, after terminating processing of the working front end OS 111 and inclusion AP 113, the multi-OS configuration section 130 will assign the resource of an input device 103, an output unit 104, and communication device 105 grade to a back-end OS 121, and will switch control of Personal Digital Assistant 100 to a back-end OS 121.

[0049] When the activation demand of an application process is inputted from a user here, necessary minimum processing shall be performed also in renewal of a front end OS 111 by operating the basic inclusion AP 123 through a back-end OS 121.

[0050] Moreover, since system data 141 and the user data 151 are stored in the system data field 140 and the user data area 150 which are different in the front end OS field 110, the back-end OS 121 which offers necessary minimum processing, and the basic inclusion AP 123 can provide a user with a front end OS 111 and the same processing as inclusion AP 113, using system data 141 and the user data 151 which were used by the front end OS 111 as it is.

[0051] The front end OS updater 122 accesses the address of the management processor 200 shown in the update information acquisition place URL in said read update information managed table 142 at step 206, and transmission of the updating data for updating a front end OS 111 and inclusion AP 113 in the newest condition is required of the management processor 200.

[0052] an install program for said updating data to update a front end OS 111 and inclusion AP 113 in the newest condition here, or difference -- you shall be any of data or the newest front end OS 111, and inclusion AP113 themselves

[0053] At step 207, the front end OS updater 122 receives the updating data transmitted from the management processor 200, and after it updates the front end OS 111 stored in the field shown by the storing address and die length in the update information managed table 142 using the updating data, and inclusion AP 113 in the newest condition, it updates information, such as a version in the update information managed table 142, and an updating date, by new contents.

[0054] At step 208, the multi-OS configuration section 130 is called through a back-end OS 121, and the reboot of a front end OS 111 and inclusion AP 113 is directed.

[0055] If a front end OS 111 and reboot directions of inclusion AP 113 are received from the front end OS updater 122, after rebooting the front end OS 111 after updating, and inclusion AP 113, the multi-OS configuration section 130 will assign the resource of an input unit 103, an output unit 104, and communication device 105 grade to a front end OS 111, and will switch control of Personal Digital Assistant 100 to a front end OS 111.

[0056] although it is necessary in the conventional Personal Digital Assistant to stop OS for updating, and actuation of Inclusion AP in case renewal of OS or Inclusion AP is performed since it is operating by performing OS and Inclusion AP stored in nonvolatile memory, if OS stops -- a Personal Digital Assistant -- if independent, since it becomes impossible to operate, the terminal body needed to bring to the service center, it needed to connect with the equipment of dedication, and a program needed to rewrite.

[0057] On the other hand, in the Personal Digital Assistant multi-OS system of this operation gestalt, since control of Personal Digital Assistant 100 is moved to a back-end OS 121 and the front end OS updater 122 is operated under control of a back-end OS 121 after stopping the front end OS 111 for updating, and inclusion AP 113, updating data can be downloaded through a network, an update process can be performed, and renewal of a front end OS 111 and inclusion AP 113 can be performed on-line.

[0058] Although this operation gestalt explained the processing which updates a front end OS 111 and inclusion AP 113 in Personal Digital Assistant 100 which stores OS and Inclusion AP in nonvolatile memory, you may apply to information processors, such as PC which loads OS and Inclusion AP which were stored in the magnetic disk drive to memory, and performs them.

[0059] Although renewal of a program is performed through the help in the conventional information processor using the record medium of portable molds, such as CD-ROM, since it updates on-line through a network with this operation gestalt, updating efficiently through a help is possible.

[0060] Moreover, under the single OS environment, although acquiring the contents of the record medium for an update process via a network, and updating on-line is also considered with the conventional information processor, when updating in order to correct OS and the fault of Inclusion AP, since communications processing will be performed using OS and Inclusion AP with fault, it may be unable to update by the ability of communications processing not performing normally according to the fault.

[0061] On the other hand, since it updates under control of the back-end OS 121 whose actuation stopped the front end OS 111 with fault, and inclusion AP 113 with this operation gestalt, and is stable, it is possible to update efficiently, without being influenced by the fault for updating.

[0062] Next, in the Personal Digital Assistant multi-OS system of this operation gestalt, the processing which realizes the security function according to the management polish 126 in the back-end OS field 120 is explained.

[0063] Drawing 4 is a flow chart which shows the procedure of the security agent 112 of this operation gestalt. As shown in drawing 4, the security agent 112 of this operation gestalt performs processing which performs the application process, when the contents of delivery and said inquiry result show the execute permission of the application process concerned to the security check processing section 124 for the inquiry of whether the processing demand is permitted when the processing demand of application is performed on Personal Digital Assistant 100.

[0064] At step 401, the security agent 112 of Personal Digital Assistant 100 investigates the contents of the processing demand of application performed on Personal Digital Assistant 100, and when the processing demand is an activate request of an application process, he progresses to step 402.

[0065] At step 402, the name of the application with which the activate request was performed is specified, and the inquiry of whether activation of the application process is permitted is sent to the security check processing section 124 via a front end OS 111, the multi-OS configuration section 130, and a back-end OS 121.

[0066] Drawing 5 is a flow chart which shows the procedure of the security check processing section 124 of this operation gestalt. As shown in drawing 5, the security check processing section 124 of this operation gestalt performs processing which answers the security agent 112 in the inquiry result which shows the contents of a judgment, after judging whether the processing demand to which the inquiry was performed is permitted according to the management polish 126 from the security agent 112.

[0067] At step 501, the security check processing section 124 of Personal Digital Assistant 100 investigates the contents of the inquiry from the security agent 112, and in being the inquiry of whether the activation the contents of an inquiry of whose are application processes is permitted, it progresses to step 502.

[0068] At step 502, with reference to the management polish 126, the contents of updating directions are read from the record of AP name which is in agreement with the name of the application specified during said inquiry, and it investigates whether there are any updating directions of the application, the contents of updating directions are "\*\*\*", and when the thing of updating directions to be is shown, it progresses to step 503.

[0069] Drawing 6 is drawing showing an example of the management polish 126 of this operation gestalt. As shown in drawing 6, the management polish 126 of this operation gestalt The management polish acquisition place URL which shows URL of the acquisition place of the newest management polish The updating date which shows the date by which the management polish 126 was updated last time, and the item of AP name which shows the name of an application process with which a check is performed by the security check processing section 124, The updating directions which show whether renewal of the application is directed, The expiration date when performing the application process shows the permitted term, It has the item of information access which shows whether access to the information in Personal Digital Assistant 100 by the application process is permitted, and the item of the communication link which shows whether the communications processing to the exterior by the application process is permitted.

[0070] At step 503, it accesses to the user AP distribution processor 300, and the latest version of the application with which said inquiry was performed is acquired from the user AP distribution processor 300, a user AP 114 is updated, and the contents of updating directions of said record in the management polish 126 are changed into "nothing."

[0071] At step 504, an expiration date is read from the record of AP name which is in agreement with the name of the application specified during said inquiry with reference to the management polish 126.

[0072] At step 505, the expiration date read from the management polish 126 is compared with a current date, when the application with which a current date is within said expiration date, and said inquiry was performed is effective, it progresses to step 506, and the inquiry result which shows that activation of the application process is permitted is sent to the security agent 112 via a back-end OS 121, the multi-OS configuration section 130, and a front end OS 111.

[0073] Moreover, as a result of step's 505 comparing the expiration date of the management polish 126, and a current date, the current date has passed said expiration date, and when the application with which said inquiry was performed is not effective, it progresses to step 507, and the inquiry result which shows that activation of the application process is not permitted is sent to the security agent 112 via a back-end OS 121, the multi-OS configuration section 130, and a front end OS 111.

[0074] At step 403, the security agent 112 progresses to step 404, when the inquiry result which shows that activation of the application process is permitted with reference to the inquiry result returned from the security check processing section 124 is received, and when that is not right, the message which shows that activation is not permitted is outputted to an output unit 104.

[0075] At step 404, the activate request of said application process is performed to a front end OS 111, the application is started, and the process ID which is the identification information for identifying the process of the started application is acquired from a front end OS 111.



[0076] At step 405, the name of said acquired process ID and application with which said activate request was performed is matched from a front end OS 111, and it stores in memory 102.

[0077] On the other hand, as a result of investigating the contents of the processing demand of application at step 401, when the processing demand is not an activate request of an application process, it progresses to step 406.

[0078] At step 406, it investigates whether it is access to the information on address book data, schedule data, etc. that the contents of the processing demand of application performed on Personal Digital Assistant 100 were stored in the user data area 150 in Personal Digital Assistant 100, and in being access to said information, it progresses to step 407.

[0079] At step 407, the process ID of an application process which performed said processing demand is acquired, and the name of the application corresponding to the process ID is read from the information on said stored process ID and application name in memory 102.

[0080] At step 408, the name of said read application is specified and the inquiry of whether access to the information in Personal Digital Assistant 100 by the application process is permitted is sent to the security check processing section 124 via a front end OS 111, the multi-OS configuration section 130, and a back-end OS 121.

[0081] At step 501, the security check processing section 124 investigates the contents of the inquiry from the security agent 112, and in not being the inquiry of whether the activation the contents of an inquiry of whose are application processes is permitted, it progresses to step 508.

[0082] At step 508, the contents of the inquiry from the security agent 112 are investigated, and in being the inquiry of whether access to the information in Personal Digital Assistant 100 according [ the contents of an inquiry ] to an application process is permitted, it progresses to step 509.

[0083] At step 509, the item of information access is read from the record of AP name which is in agreement with the name of the application specified during said inquiry with reference to the management polish 126.

[0084] At step 510, with reference to the contents of an item of information access read from the management polish 126, when access to the information in Personal Digital Assistant 100 is permitted, it progresses to step 511, and the inquiry result which shows that access to the information in Personal Digital Assistant 100 by the application process is permitted is sent to the security agent 112 via a back-end OS 121, the multi-OS configuration section 130, and a front end OS 111.

[0085] Moreover, as a result of referring to the contents of an item of information access read from the management polish 126 at step 510, when access to the information in Personal Digital Assistant 100 is not permitted, it progresses to step 512, and the inquiry result which shows that access to the information in Personal Digital Assistant 100 by the application process is not permitted is sent to the security agent 112 via a back-end OS 121, the multi-OS configuration section 130, and a front end OS 111.

[0086] At step 409, with reference to the inquiry result returned from the security check processing section 124, the security agent 112 progresses to step 410, when the inquiry result which shows that access to the information in Personal Digital Assistant 100 by the application process is permitted is received, and when that is not right, the message which shows that access to the information is not permitted is outputted to an output unit 104.

[0087] At step 410, the access request to the information performed by said application process is performed to a front end OS 111, access to the information is performed, the processing result is acquired from a front end OS 111, and it returns to the application concerned.

[0088] On the other hand, as a result of investigating the contents of the processing demand of application at step 406, when the processing demand is not an access request to the information in Personal Digital Assistant 100, it progresses to step 411.

[0089] At step 411, it investigates whether the contents of the processing demand of application performed on Personal Digital Assistant 100 are the communication link demands to the Personal Digital Assistant 100 exterior, and in being the communication link demand to said exterior, it progresses to step 412.

[0090] At step 412, the process ID of an application process which performed said processing demand is acquired, and the name of the application corresponding to the process ID is read from the information on said stored process ID and application name in memory 102.

[0091] At step 413, the name of said read application is specified and the inquiry of whether the communications processing to the Personal Digital Assistant 100 exterior by the application process is permitted is sent to the security check processing section 124 via a front end OS 111, the multi-OS configuration section 130, and a back-end OS 121.

[0092] After processing of step 501, at step 508, the security check processing section 124 investigates the contents of the inquiry from the security agent 112, and in not being the inquiry of whether access to the information in Personal Digital Assistant 100 according [ the contents of an inquiry ] to an application process is permitted, it progresses to step 513.

[0093] At step 513, the contents of the inquiry from the security agent 112 are investigated, and in being the inquiry of whether the communications processing to the Personal Digital Assistant 100 exterior according [ the contents of an



inquiry ] to an application process is permitted, it progresses to step 514.

[0094] At step 514, a communicative item is read from the record of AP name which is in agreement with the name of the application specified during said inquiry with reference to the management polish 126.

[0095] At step 515, with reference to the contents of an item of the communication link read from the management polish 126, when the communications processing to the Personal Digital Assistant 100 exterior is permitted, it progresses to step 516, and the inquiry result which shows that the communications processing to the Personal Digital Assistant 100 exterior by the application process is permitted is sent to the security agent 112 via a back-end OS 121, the multi-OS configuration section 130, and a front end OS 111.

[0096] Moreover, as a result of referring to the contents of an item of the communication link read from the management polish 126 at step 515, when the communications processing to the Personal Digital Assistant 100 exterior is not permitted, it progresses to step 517, and the inquiry result which shows that the communications processing to the Personal Digital Assistant 100 exterior by the application process is not permitted is sent to the security agent 112 via a back-end OS 121, the multi-OS configuration section 130, and a front end OS 111.

[0097] At step 414, with reference to the inquiry result returned from the security check processing section 124, the security agent 112 progresses to step 415, when the inquiry result which shows that the communications processing to the Personal Digital Assistant 100 exterior by the application process is permitted is received, and when that is not right, the message which shows that the communications processing to the exterior is not permitted is outputted to an output unit 104.

[0098] At step 415, the communication link demand to the exterior performed by said application process is given to a front end OS 111, the communications processing to the exterior is performed, the processing result is acquired from a front end OS 111, and it returns to the application concerned.

[0099] As mentioned above in Personal Digital Assistant 100 of this operation gestalt The processing demand of application performed on Personal Digital Assistant 100 of the security agent 112 Reception, According to the management polish 126, it judges whether the processing demand is permitted in the security check processing section 124. Since the security function is offered with Personal Digital Assistant 100 by performing an application process according to the judgment result The security function suitable for the operating application by the side of the company which is a user can be given because a service entrepreneur sets the information on the access propriety of application as the management polish 126 on different criteria.

[0100] In addition, although this operation gestalt explained the security function to the expiration date of application, information access in Personal Digital Assistant 100, and the communications processing to the exterior Set up a different expiration date for every version of an application process, or Different access propriety data for every information on the address book data in Personal Digital Assistant 100, or schedule data, Security functions to other items, such as setting up different propriety data for every contents of access, such as read-out, writing, and deletion, or setting up different propriety data for every URL of a communication link place, may be added.

[0101] Moreover, since it is lost that a front end OS 111 carries out direct access to the management polish 126 by being made to perform this security check processing and management of the management polish 126 under control of a back-end OS 121, even if it is the case where a new security hole is discovered by the newest front end OS 111, unjust access to the management polish 126 by that security hole can be prevented, and high security can be maintained. Furthermore, if the processing which carries out direct access from a front end OS 111 to the back-end OS field 120 by making the front end OS field 110 and the back-end OS field 120 into different virtual memory space is forbidden, it is possible to offer still higher security.

[0102] Furthermore, in Personal Digital Assistant 100 of this operation gestalt, when the function of business oriented application is changed according to change of a work breakdown, the management polish in the management processor 200 is changed, and remote maintenance of the management polish 126 of Personal Digital Assistant 100 can be carried out by the management polish updater 125 by updating the management polish 126 in Personal Digital Assistant 100 according to the contents of the management polish in the management processor 200.

[0103] Drawing 7 is a flow chart which shows the procedure of the management polish updater 125 of this operation gestalt. As shown in drawing 7 , the management polish updater 125 of this operation gestalt performs processing which updates the management polish 126 in Personal Digital Assistant 100 according to the contents of the management polish stored in the management processor 200.

[0104] The management polish updater 125 of Personal Digital Assistant 100 investigates whether when a specific key was pressed from progress of the predetermined time from the last processing, or a user, the predetermined conditions which start an update process of the management polish 126 were fulfilled at step 701, and when said conditions are fulfilled, it progresses to step 702.

[0105] At step 702, the management polish acquisition place URL which shows URL of the acquisition place of the newest management polish, and the management polish 126 read the updating date which shows the date updated last

time with reference to the management polish 126 stored in Personal Digital Assistant 100.

[0106] The management polish updater 125 accesses the address of the management processor 200 shown in said read management polish acquisition place URL at step 703, and transmission of the update information of the management polish stored in the management processor 200 is required of the management processor 200.

[0107] If an acquisition demand of the update information of a management polish is received from Personal Digital Assistant 100, the management polish stored in the management processor 200 will read the updating date which shows the date updated last time, and will transmit the management processor 200 to Personal Digital Assistant 100.

[0108] If the management polish updater 125 of Personal Digital Assistant 100 receives front end OS update information from the management processor 200, it will progress to step 704, the updating date read from the management polish 126 is compared with the updating date which received from the management processor 200, and when the updating date of the management polish 126 stored in Personal Digital Assistant 100 is older, an update process of the management polish 126 progresses to step 705 as a required thing.

[0109] At step 705, a halt of processing of halt directions of processing in delivery and the security check processing section 124 is directed in the security check processing section 124 through a back-end OS 121.

[0110] If halt directions of processing are received from the management polish updater 125, the security check processing section 124 will go into the waiting state which waits for the resumption directions of processing, after terminating the security check processing under current processing.

[0111] At step 706, the management polish updater 125 accesses the address of the management processor 200 shown in said read management polish acquisition place URL, and requires transmission of the newest management polish data of the management processor 200.

[0112] At step 707, the management polish updater 125 receives the management polish data transmitted from the management processor 200, and updates the management polish 126 in the newest condition using the management polish data. Under the present circumstances, AP name shown in the updated management polish 126 is compared with a user's AP 114 name stored in the front end OS field 110. When the newest user's AP information which is not stored in Personal Digital Assistant 100 in the updated management polish 126 is included It may access to the user AP distribution processor 300, said newest user AP may be downloaded, and the user AP 114 of the front end OS field 110 may be updated. Moreover, when updating directions of application are in the updated management polish 126, you may update the application here.

[0113] At step 708, the restart of processing of restart directions of processing in delivery and the security check processing section 124 is directed in the security check processing section 124 through a back-end OS 121.

[0114] The security check processing section 124 will be in the condition that security check processing which uses the updated management polish 126 can be performed, if restart directions of processing are received from the management polish updater 125.

[0115] As mentioned above, when the function of business oriented application is changed in Personal Digital Assistant 100 of this operation gestalt according to change of a work breakdown, it is possible by changing the management polish in the management processor 200 to perform the user AP 114 in Personal Digital Assistant 100 and remote maintenance of the management polish 126.

[0116] Since a front end OS is updated under control of Back-end OS according to the Personal Digital Assistant of this operation gestalt like when [ which was explained above ] judged with a front end OS needing to be updated, it is possible to update OS of a Personal Digital Assistant efficiently.

[0117] Moreover, since the processing demand of the application permitted according to the management polish is performed according to the Personal Digital Assistant of this operation gestalt, it is possible to realize the security function based on a user's original criteria with a Personal Digital Assistant.

[0118] Moreover, since the management polish in a Personal Digital Assistant is updated according to the contents of the management polish stored in the management processor according to the Personal Digital Assistant of this operation gestalt, it is possible to carry out remote maintenance of the security function in a Personal Digital Assistant.

[0119]

[Effect of the Invention] Since a front end OS is updated under control of Back-end OS when judged with a front end OS needing to be updated according to this invention, it is possible to update OS of an information processor efficiently.